

REMARKS

In the Office Action dated July 16, 2003, the Examiner has rejected Claims 1-7 under 35 U.S.C. §102(b) as being anticipated by Dubrow (U.S. Patent No. 5,164,055), Madabhushi et al. (U.S. Patent No. 5,567,292) or Hooper et al. (U.S. Patent No. 5,885,432); and Claims 8-10 have been rejected under 35 U.S.C. §102(b) as anticipated by or, in the alternative, under 35 U.S.C. §103(a) as being unpatentable over Dubrow, Madabhushi et al. or Hooper et al.

Claim 1 has been amended to incorporate Claim 9. Claims 9 and 11-29 have been cancelled. Accordingly, Claims 1-8 and 10 are pending. A Declaration under 37 C.F.R. §1.132 by Dr. Ben Chu accompanies this Amendment

Present Invention

The present invention includes polymer solutions that are useful as separation media for electrophoresis, in particular, capillary electrophoresis. These polymer solutions comprise a plurality of different polymers in the form of **interpenetrating networks** (IPNs).

In order to produce media comprising the IPNs of the present invention, the media must be produced in a specific manner as described in the specification. These IPNs are produced by forming a matrix from a first polymer; and then, polymerizing a second polymer within the matrix. (See page 10, lines 1-2, of the specification.) For example, PAM was synthesized in a PVP solution matrix so that the PAM chains were grown in a network of PVP chains. (See page 26, lines 19-20, of the specification.)

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Cancelled Claim 9 recited that the interpenetrating networks are prepared by synthesizing a first polymer in the matrix of a second polymer. Claim 1 has been amended to incorporate cancelled Claim 9 into Claim 1.

Interpenetrating networks can not be prepared by simply mixing one polymer into another. See page 26, lines 10-11, of the specification. Also see the 37 CFR §1.132 Declaration (Item 5).

As stated by Dr. Chu in the 37 1.132 Declaration (Items 7 - 9), the cited prior art references, Dubrow, Madabhushi et al. and Hooper et al., do **not** disclose IPNs. Instead, they describe **mixtures** of polymers.

Polymer mixtures are different structurally and functionally from the IPNs of the present invention. (See the 37 1.132 Declaration (Items 6 and 10).) For example, the IPNs, formed from a first and second polymer, have a lower weight to volume ratio than the combined weight to volume ratios of the first polymer and the second polymer. (See paragraph bridging pages 14 and 15 in the specification.) Also, each polymer in the IPN has an overlap concentration that is greater than its own overlap concentration. Additionally, as stated in the sentence bridging pages 26 and 27 of the specification, laser light scattering studies evince the formation of interpenetrating networks.

As stated by Dr. Chu in the 37 1.132 Declaration, a first and second polymer in the form of a IPN provide superior separation results vis-à-vis the same first and second polymer in the form of a mixture.

First Rejection under 35 U.S.C. §102

Claims 1-7 are rejected under 35 U.S.C. §102(b) as being anticipated by Dubrow (U.S. Patent No. 5,164,055). The Examiner states that the reasons for rejection were given in the December 4, 2002 Office Action.

The Examiner states that “Dubrow teaches a polymer solution containing a **mixture** of water-soluble polymers, exemplified by polyacrylamide and polyethylene oxide, in a network for use in electrophoretic separation.” (December 4, 2002 Office Action page 4, third paragraph, emphasis added.)

The present application discloses **interpenetrating networks** of different polymers. These interpenetrating networks are produced by forming a matrix from a first polymer; and then, polymerizing a second polymer within the matrix. As discussed above, interpenetrating networks cannot be prepared by simply mixing one polymer into another. Cancelled Claim 9 recited that the IPN is prepared by synthesizing a first polymer in the matrix of a second polymer. Claim 1 has been amended to incorporate cancelled Claim 9 into Claim 1.

In contrast, Dubrow does not disclose interpenetrating networks of polymers. Instead, Dubrow describes his matrix as a mixture of a first polymer and a second polymer. (See Claim 2.) Dubrow describes the preparation of his matrices by mixing together two polymers solutions. In particular, Example 6, entitled “Mixed Polymer Matrix,” describes how the Dubrow matrices are made. The two polymers of the matrix are hydroxyethylene cellulose (HEC) and polyacrylamide. The two separate polymer solutions are mixed together along with other ingredients, including a catalyst and a TBE buffer. (See Col. 20, Lines 45-60.)

Since Dubrow does not disclose all the claim limitations of independent Claim 1, namely IPNs formed by different polymers, Dubrow cannot anticipate the present invention.

Second Rejection under 35 U.S.C. §102

Claims 1-7 are rejected under 35 U.S.C. §102(b) as being anticipated by Madabhushi et al. (U.S. Patent No. 5,567,292). The Examiner states that the reasons for rejection were given in the December 4, 2002 Office Action.

The Examiner states that “Madabhushi et al. teach a polymer solution containing a mixture of water-soluble polymers, at least one representing a ‘silica-absorbing polymer’ of the present claim 7, in a network for use in electrophoresic separation.” (December 4, 2002 Office Action page 4, fourth paragraph, emphasis added.)

The present application discloses **interpenetrating networks** of different polymers. These interpenetrating networks are produced by forming a matrix from a first polymer; and then, polymerizing a second polymer within the matrix. As discussed above, interpenetrating networks cannot be prepared by simply mixing one polymer into another. Cancelled Claim 9 recited that the interpenetrating network is prepared by synthesizing a first polymer in the matrix of a second polymer. Claim 1 has been amended to incorporate Claim 9 into Claim 1.

In contrast, Madabhushi et al. disclose media for separating biomolecules which include a polymeric “sieving component” and a polymeric “surface interaction component.” These media are formed by **mixing** the two components together. (For example, see Col. 13, Lines 1-4.) Accordingly, unlike Claim 1 of the present application, Madabhushi et al. do not disclose interpenetrating networks.

Since Madabhushi et al. do not disclose all the claim limitations of independent Claim 1, namely IPNs, Madabhushi et al. cannot anticipate the present invention.

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Third Rejection under 35 U.S.C. §102

Claims 1-7 are rejected under 35 U.S.C. §102(b) as being anticipated by Hooper et al. (U.S. Patent No. 5,885,432). The Examiner states that the reasons for rejection were given in the December 4, 2002 Office Action.

The Examiner states that “Hooper et al. teach a polymer solution containing a mixture of water-soluble polymers, at least one representing a ‘silica-absorbing polymers’ of claim 7, in a network for use in electrophoresic separation.” (December 4, 2002 Office Action page 4, fifth paragraph, emphasis added.)

The present application discloses **interpenetrating networks** of different polymers. These interpenetrating networks are produced by forming a matrix from a first polymer; and then, polymerizing a second polymer within the matrix. As discussed above, interpenetrating networks cannot be prepared by simply mixing one polymer into another. Cancelled Claim 9 recited that the interpenetrating network is prepared by synthesizing a first polymer in the matrix of a second polymer. Claim 1 has been amended to incorporate Claim 9 into Claim 1.

Since Hooper et al. do not disclose all the claim limitations of independent Claim 1, namely IPNs, Hooper et al. do not anticipate the present invention.

Rejection under 35 U.S.C. §102/35 U.S.C. §103(a)

Claims 8-10 have been rejected under 35 U.S.C. §102(b) as anticipated by or, in the alternative, under 35 U.S.C. §103(a) as being unpatentable over, Dubrow, Madabhushi et al. or Hooper et al. (December 4, 2002 Office Action, page 5, paragraph 11.)

The Examiner concedes that “Dubrow, Madabhushi et al. or Hooper et al. do not expressly teach the disclosed entanglement properties and base read lengths” of the present invention. The Examiner further states that “it is reasonable that said properties in the polymer solutions of Dubrow, Madabhushi et al. or Hooper et al. would be the same as in the presently claimed solution since the **composition** of Dubrow, Madabhushi et al. or Hooper et al. are essentially the same as the claimed solution.” (December 4, 2002 Office Action page 5, third paragraph, emphasis added.)

As described above, the present application discloses electrophoretic media comprising polymers in the form of **interpenetrating networks**. As stated by the Examiner, the “entanglement properties” of the present invention are not disclosed by the cited references. The Examiner attempts to remedy this deficiency in the references by stating that the references disclose solutions that contain the same composition as the solutions of the present invention; and thus the solutions of the cited references and the present invention are “essentially the same.”

However, as described above, **in order to produce media comprising the interpenetrating networks of the present invention, the media must be produced in a specific manner as described in the specification.** The Examiner states that “Dubrow, Madabhushi et al. or Hooper et al. do not expressly teach the polymer solutions to be prepared by synthesizing one polymer in the presence of the other...” as described by the present invention. (December 4, 2002 Office Action page 5, last paragraph.)

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Thus even if the cited references did disclose solutions that contain the same composition as the solutions of the present invention (for argument's sake only), the media would be different. That is, the media of the prior art and the media of the present invention would be structurally different, as discussed above.

The cited prior art references do not disclose an interpenetrating polymeric structure. Thus, the cited references do not teach or suggest all the limitations recited in the claims. Accordingly, the present invention is not anticipated by, nor obvious over, the cited references. Also see the accompanying 37 CFR §1.132 Declaration (Items 6 and 10).

Applicants respectfully submit that the application is now in condition for allowance, which action is earnestly solicited. If resolution of any remaining issue is required prior to allowance of this application, it is respectfully requested that the Examiner contact Applicants' undersigned attorney at the telephone number provided below.

Respectfully submitted,



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